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DEEP-SEA FISHING

Deep-Sea Fishing and Fishing Boats. An Account of the Practical Working of the various Fisheries around the British Islands. With Illustrations, &c. By Edmund W. H. Holdsworth, F.L.S., &c., late Secretary to the Royal Sea Fisheries Commission. (London: Edward Stanford, Charing Cross, 1874.)

MR. HOLDSWORTH, having officiated as secretary to the Royal Commissioners who inquired into the state of the British fisheries in 1863, and whose report was presented to Parliament in 1866, has had access to the very best information and to people who have all the "ins and outs" of the fisheries at their fingers' ends. As might be expected, therefore, from the opportunities of its author, this is an excellent work of its kind, forming a complete directory to the fishing ports of Great Britain and Ireland; and persons about to embark in any kind of fishery enterprise could not have a better guide. Although the author makes no parade of being scientific, and has no pretension to unfold other than an unvarnished tale of our fishery resources, the book is not devoid of interest for scientific persons, seeing that it contains some account of Prof. Sars' discoveries with regard to the floating of fish spawn. Moreover, Mr. Holdsworth's work appears opportunely enough, seeing that the daily newspapers are indulging in discussions regarding oyster-spat, over-dredging, and cognate subjects.

The question of "over-fishing" is of the first importance, because we are dependent on the sea for a vast proportion of our food supplies. On this subject the author of "Deep-Sea Fishing" is evidently at one with his late masters, but in discussing it he is compelled to admit a large increase in the machinery of capture; indeed, the book is very much a record of that fishery improvement which, so far as the catching apparatus is concerned, has now become pretty general. Although it is wise to accept, discuss, and analyse all the information we are able to lay hands upon which bears on the question of our daily supplies of food, we shall not at present say more about "over-fishing," so far as that question is incidentally alluded to by Mr. Holdsworth, than that his inferences and his facts are very much at variance. Put in a nutshell, nothing can withstand the logic of the case for those who say we are "over-fishing;" it is, that the supply of fish being equal to what it was, an increased number of boats and an improved mode of capture, with constant multiplication of the apparatus of capture, should, in a given ratio, add to the supplies of fish which are brought to market. Issue has been joined between those who say our fisheries are not so productive as they ought to be, and those who aver that we are "over-fishing;" and, so far as the evidence we have seen goes, the latter party have, we think, the best of the argument.

It is of the greatest importance to the present and future of our fisheries that we should fish with economy, and, above all, that we should fish in such a manner as will not wantonly waste the spawn of our best table fishes. At present the waste of spawn, through the capture of gravid and immature fish, is so enormous as to be incalculable. It has been said of the salmon, that although an individual may be of the value of ten shillings per pound weight on a Bond-street counter, it is worth five times that price when it is on the spawning "pedds." The same may be said of all fish, even of those which we least esteem for food purposes. In times past, fish have been held so cheap, in consequence of the liberal ideas which were prevalent as to their great abundance, that men thought it of no importance whether the fish they ate were or were not full of spawn; indeed, customers thought themselves rather ill-treated when their fish-merchant sent them a fish without its roe; and, as a rule, fishmongers cannot do otherwise than send "full fish" to all who purchase, for the very excellent reason that it is at the season when they are about to become reproductive that man obtains easy access to them. It is also the season when they are most unfit for food. No grazier or cattle-feeder in his right mind would kill a cow when large with calf, or a mare big with foal. And putting the case another way, if all our oxen were killed as calves, and our sheep while they were lambs, should we not very speedily be on the verge of famine? Yet these are the modes of doing business which prevail in our fisheries. It is well that the inhabitants of the sea are so prolific in their seasons of reproductiveness; were they less so than they are, a very few years would exhaust even the productive cod banks of Newfoundland.

As regards salmon, the percentage of eggs which come to life and yield fish is pretty well known, as is also the percentage of young fish which is destroyed. The number of salmon (*Salmo salar*) which escape infantile perils and become reproductive is very small, not ten per cent. Out of every hundred eggs spawned in the natural state, it may be calculated that at least one-third escape the action of the fecundating milt, that another third never, from various causes, come to life, which leaves only one-third to produce fish; and of the thirty-three tiny animals thus left, a full half will be killed by enemies, which are numerous, leaving, say, sixteen young smolts to become grilse, and as these have to make one voyage to the sea, or probably two, before they become reproductive, their number in the end becomes sadly reduced, so reduced that probably not five of them will be able to repeat the story of their birth and so provide future supplies. If the mortality incident to fish life be so great in a salmon river, what must it not be in the ravening depths of the ocean? A large cod-fish we know yields more than a million of eggs, but when we consider the fact of these eggs being entrusted to the boisterous waves of the sea, we have little hope that the yield of reproducing fish will be greater than in the case of the salmon, which enjoys the comparative tranquillity of inland streams. Much ignorance has hitherto prevailed as to how fish spawn. The salmon we have been able to watch day by day, and to note every action whilst it is engaged in that great function of its nature, and we also know a little about the reproduction of the herring, but as regards the reproductive *modus operandi* of our larger sea-fish, much that we know, or think we know, is only the result of guessing or of reasoning from analogy. M. Sars has discovered that the ova of some fishes, notably the ova of the cod (*Gadus morrhua*) and of the plaice

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(*Pleuronectes platessa*), are hatched whilst floating on the waves. Ova of these and other fishes have been found floating in different stages of development. There is no doubt of this fact, and in some of the larger rivers of China the spawn of fishes is known to float on the surface, for it is collected at certain places for piscicultural purposes, by means of bunches of grass and soft matting. These, it is known, become the recipients of large numbers of fish eggs, and are easily removed to other waters; which, being barren of fish, are in this mode repopulated. There cannot, we think, be a doubt that various fishes spawn in various places, some at the bottom of the sea, some on the surface; and it is very likely, by this diversity, that the varied species are best preserved. The herring (*Clupea harengus*), and probably all its congeners (but this is not quite certain), spawn on the bottom, and the eggs remain there, adhering in masses to the rocks and stones. The eggs of the salmon, we know, when not washed away during deposition by flooded water, sink, by means of their weight, to the bottom, where the parent fish instinctively covers them up with gravel in order to protect them from their numerous enemies. Most sea-fish, we have a strong impression, emit their spawn in the same manner, whatever future direction it may take in the way of motion. All the fish eggs which we have seen gathered from the surface of the water were almost at maturity; and the late Mr. Robert Buist, of the Tay fisheries, informed the writer that he had seen salmon eggs, as the time approached for the *eclosion* of the fish, rise to the top of the water in the breeding boxes at Stormontfield, *but they always sank again before the birth of the fish.*

What practical bearing has all this on the economy of our fisheries? will be asked. There is one *point* which Mr. Holdsworth makes in detailing M. Sars' discoveries, and it is, briefly stated, "what becomes of all the complaints against the beam trawl net"? That ponderous instrument, as all of us are aware, has been accused of breaking up the spawning beds and killing the fry; but naturally, if there is truth in the discoveries of M. Sars, and if the spawn float on the waves, that accusation must fall to the ground. That the trawl net "hashes" the fish which it captures, and destroys a large number that it does not capture, is well known, but not any of our modes of fishing are perfect. It is not possible to dictate to the fish as to which are to enter or stay out of the death chamber. Nor, if a hundred hooks be set with bait for the line fishery, can we dictate as to what size of cod-fish or haddocks should take the hook. One thing we can do: we can reject all fish which are of insufficient size or have not had an opportunity of multiplying their kind. Most of the line fish when taken on board are alive, and also a large percentage of fish that are trawled. Those which are too small might be restored to their native element. We are ourselves recommending this plan. So far as we understand Mr. Holdsworth, he only confines himself to an exposition of how we fish: as to how we *should* fish he is silent; in fact, he is satisfied with the deliverance of the Royal Commission of 1863, of which he was the secretary, that our fish supplies have increased and are likely still further to increase. We should not in the least object if the increased supplies kept pace with the augmented machinery of capture.

JARDINE'S "PSYCHOLOGY OF COGNITION"

The Elements of the Psychology of Cognition. By Robert Jardine, B.D., D.Sc., Principal of the General Assembly's College, Calcutta, and Fellow of the University of Calcutta. (Macmillan and Co., 1874.)

MR. JARDINE has seemingly had some personal reason for writing this treatise; for in the preface he asks the critic to bear in mind "that the book has been written with considerable haste, in order to secure its publication within a certain limited time." It would have been wiser to ignore the critic: for this unsympathetic personage is only too certain to meet this innocent confidence with the unfeeling remark that perhaps the interests of science would not have suffered had the author taken a little more time over his work. Had nothing been done before Mr. Jardine began to write "to show the inadequacy and unsatisfactoriness of a prevailing system of psychology," he would have required to make a much more thorough and more direct attack on the teachings of Mr. Mill and Prof. Bain, in order to accomplish "one principal object" that he had in view. Again, we think Mr. Jardine would have better consulted the interests of his readers generally, including the "students," for whom the book was "principally designed," had he made more explicit reference to the writers to whom he is indebted for the weapons he has employed in this attack on "phenomenalism." Another general criticism that must be made is, that there is not a sufficient wealth of concrete illustration, and that, though the writer has "endeavoured to express himself in as clear and simple language as possible," his words are, nevertheless, often dark and difficult enough. What will readers "beginning their philosophical studies" make of such a sentence as this?—"It must be borne in mind that it is in their character as modes of the non-ego that objectified sensations are localised. The localising is, therefore, not so much an act of consciousness as a precept of consciousness and a form of the non-ego."

We do not find it easy to review this book fairly. For one thing, the author has no personality; then, while on the one hand it would be very easy to speak of the excellence of many pieces of exposition, on the other hand nothing could be easier than to select a few passages for unmitigated censure. On the strength, for example, of the following sentence, one might almost question the claim of the writer to rank as a scientific student of the subject on which he has written:—"In the scientific mind of modern times," says Mr. Jardine, "there has arisen, through the influence of a long-continued and exclusive study of phenomena, a predisposition to doubt the occurrence of events which are plainly beyond the sphere of phenomenal laws." The worst of it is that long before we reach this sentence, which occurs near the end of the book, we have come to regard Mr. Jardine as a man of such respectable ability that we have the greatest difficulty in believing that he can really think that anything he has said can carry him a single step towards the goal he now seems anxious to reach. The scientific men of modern times are innocent enough of having their minds "vitiated by the prevailing phenomenalism" represented by Mr. Mill and Prof. Bain. They have indulged in an exclusive

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